WHAT IS *RANUNCULUS GELIDUS* (RANUNCULACEAE)?

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ABSTRACT

The name *Ranunculus gelidus* is commonly used in North American literature for a widespread arctic-montane buttercup, but some recent American references have called this species *R. karelinii*, while Asian references use the names *R. gelidus* and *R. karelinii* for an endemic species of central Asia, and use the name *R. grayi* for the plant of eastern Siberia and western North America. *Ranunculus gelidus* is the correct name for a narrow endemic in the Tian Shan and Jungar Shan of central Asia, and *R. karelinii* is illegitimate (a superfluous replacement for *R. gelidus*). Populations from eastern Siberia and North America, which differ from *R. gelidus* in their straight (not inflexed) achene beak, smaller petals, and less deeply divided leaves, are correctly known as *R. grayi*. The section in which this species is placed is correctly called *Ranunculus* sect. *Epirotes* (Prantl) Benson—"*Ranunculus* sect. *Auricomus* Spach," used in some recent publications, is not valid.

RESUMEN

El nombre *Ranunculus gelidus* se usa comúnmente en Norte América para un ranúnculo común en la zona ártico-montana, pero algunas referencias recientes americanas han llamado a esta especie *R. karelinii*, mientras que en las referencias asiáticas se usan los nombres *R. gelidus* y *R. karelinii* para una especie endémica de Asia central, y usan el nombre de *R. grayi* para la planta del este de Siberia y el oeste de Norte América. *Ranunculus gelidus* es el nombre correcto para un endemismo de Tian Shan y Jungar Shan en Asia central, y *R. karelinii* es ilegítimo (un reemplazo superfluo de *R. gelidus*). Las poblaciones del este de Siberia y Norte América, que difieren de *R. gelidus* por el pico del aquenio derecho (no inflexo), pétalos más pequeños, y hojas divididas menos profundamente, deben llamarse *R. grayi*. La sección en la que debe incluirse esta especie debe nombrarse como *Ranunculus* sect. *Epirotes* (Prantl) Benson—"*Ranunculus* sect. *Auricomus* Spach," usada en algunas publicaciones recientes, no es válida.

Treatments of *Ranunculus* in North America have generally used the name *R. gelidus* Karelin & Kirilov for a small buttercup that is widespread in arctic and alpine regions of western North America and eastern and central Asia (Benson 1948; Hitchcock & Cronquist 1964; Scoggan 1978; Whittemore 1997). However, a number of recent North American publications (Qian & Klinka 1998; Kartesz & Meacham 1999; Panjabi & Anderson 2006; Kratz 2007; NRCS 2008) treat this species under the name *R. karelinii* Czerep. This usage is questionable on several grounds. First, *R. karelinii* was not published until 1981, and three older names are listed in the synonymy of *R. gelidus* in North American references (*R. grayi* Britton 1891, *R. verecundus* B.L. Robinson ex Piper 1906, and *R. ramulosus* M.E. Jones 1912; Benson 1948; Hulten 1968a; Whittemore 1997). Second, recent Asian references (Ovchinnikov 1937; Baitenov et al. 1961; Voroshilov 1982; Tumokhina 1992; Cherepanov 1995; Borodina-Grabovskaya et al. 2001; Wang & Gilbert 2001) use the name *R. karelinii* for a species endemic to Central Asia, and treat specimens from eastern Siberia and North America as *R. grayi* Britton. Third, the name *R. karelinii* is superfluous and illegitimate according to IPNI (2008).

This widespread buttercup is currently going under three names (*R. gelidus*, *R. grayi*, and *R. karelinii*) in recent floristic literature, an unsatisfactory situation. The taxonomy and nomenclature of the species was investigated, as it relates to both the North American species and the type material from central Asia, to determine the correct name for the species.

NOMENCLATURE

Cherepanov (1981) concluded that *Ranunculus gelidus* Karelin & Kirilov 1842 is an invalid homonym because he felt that *R. gelidus* Hoffm. was validated earlier by Reichenbach (1830–33, p. 720). However, examination of this publication makes it clear that *R. gelidus* Hoffm. was not validly published. Reichenbach listed "*R. gelidus* Hffgg." under *R. glacialis* forma α, formatted like synonyms elsewhere in the book, not like names of other formae in the species (which have a single Latin epithet, not preceded by "*R.*"; Fig. 1). Hoffmansegg's

4584. R. glacialis *L.* foliis ternatis, foliolis tripartito-multifidis, caulinis sessilibus, caule pauciflore, calycibus ferrugineo-hirsutis, petalis rotundatis, squama nectarii brevissima bifida. — Tres inprimis formas distinguo: α. *R. gelidus Hffgg.* ≍ *alpestri-glacialis?* foliis *R. alpestris* cordato-reniformibus 3—5-partitis, partitionibus trifidis obtusis. — β. *glacialis genuinus*: foliis circumscriptione rotundâ 3—5-partitis, partitionibus tripartito-trifidis incumbentibus; huc pl. borealis: *Linn.* lapp. t. 3. f. 1. Fl. dan. t. 19. et tyrolensis: *Wulf.* in *Jacq.* coll. I. t. 8. et 9. f. 1. 2. — γ. *crithmifolius*: foliis extensis, partitionibus longius petiolulatis triter-

◄ A

B ▼

≍ signo hybriditatis usus sum in sectione secunda tertiaque.

FIG. 1. A. Part of the description of *Ranunculus glacialis* from Reichenbach (1830–33 p. 720), showing the incidental mention of "*R. gelidus* Hffgg." associated with the description of *R. glacialis* forma α. B. A short excerpt from the "Praemonenda" of Reichenbach (1830–33 p. iv), explaining the unusual symbol in the discussion shown in part A.

unpublished name cannot be validated at the species level by its association with Reichenbach's description of a forma, so the supposed name "*Ranunculus gelidus* Hoffmansegg ex Reichenbach" does not exist. *Ranunculus gelidus* Karelin & Kirilov is therefore a valid name and is not a superfluous name as concluded by Cherepanov. The editors of IPNI are correct in concluding that it is *R. karelinii* Czerep., not *R. gelidus* Karelin & Kirilov, that is superfluous and illegitimate.

A second nomenclatural problem associated with these species is the correct name of the section to which the species belongs. North American publications (Benson 1948; Whittemore 1997) refer to it as *Ranunculus* sect. *Epirotes* (Prantl) Benson, while some recent European references (Tutin & Akeroyd 1993; Hörandl et al. 2005) refer to it as *Ranunculus* sect. *Auricomus* Spach. However, Spach (1839, p. 210) published this taxon at the rank of subgenus, not section, as already noted by Benson (1948). *Ranunculus* sect. *Epirotes* is thus the correct name for this taxon at the rank of section.

TAXONOMY

North American and east Asian material of this buttercup was considered conspecific with the central Asian *Ranunculus gelidus* by Ostenfeld (1909, p. 44). Benson, in his 1948 monograph of North American *Ranunculus*, explicitly stated that he had not seen central Asian material of *R. gelidus*, and was following Ostenfeld in treating North American material under this name. In order to evaluate the relationship of the North American buttercup to the type of *R. gelidus*, herbarium material from Central Asia (including isotype material of *R. gelidus*) was compared with North American material for characters used by Asian authors (Ovchinnikov 1937; Borodina-Grabovskaya et al. 2001; Wang & Gilbert 2001) to distinguish *R. gelidus s. str.* from similar species of *Ranunculus*. Several characters support the distinction of the Central Asian populations to which the type of *R. gelidus* belongs from the North American and east Asian plant.

First, Asian references emphasize trifoliolate leaves with petiolulate leaflets in *Ranunculus gelidus s. str.* North American and Siberian plants referred to *R. gelidus s. lat.* or *R. grayi* are described as having the leaf blade 3-parted but not compound (Benson 1948; Voroshilov 1982; Tumokhina 1992; Whittemore 1997). Leaf morphology is somewhat more variable than the literature suggests, and North American specimens rarely may have the blade of the basal leaves divided to the base and thus technically compound, but the leaflets are sessile, a condition not seen in specimens or in published descriptions of central Asian *R. gelidus*

s. str. The shape of the leaf segments also differs, with the ultimate segments being oblanceolate to obovate in Central Asian specimens and narrowly oblong or linear in North American specimens. Stem leaves often have narrower segments than basal leaves, but they also never have well-defined petiolules in North American material. The range of variation in the two regions is certainly different.

Second, North American and Siberian material that has been assigned to *Ranunculus gelidus* has the petals only 3–6 mm long, scarcely longer than the sepals. Isotype material of *R. gelidus* and other Central Asian specimens, however, have larger petals, 7–9 mm long (to 10 mm according to Wang & Gilbert 2001), about twice as long as the sepals.

Third, the achenes of North American and Siberian material that has been assigned to *Ranunculus gelidus* show a morphology similar to most members of *Ranunculus* sect. *Epirotes* (Prantl) Benson, with the beak of the fruit parallel to the long axis of the achene. In Central Asian specimens, however, the beak is displaced, originating on the adaxial side of the achene at an angle of ca 90° to the axis of the achene. This character is unusual in the genus, and was emphasized by Ovchinnikov (1937) in erecting *Ranunculus* cycle *Gelidi* Ovch. for two Central Asian species, *R. gelidus* and *R. rufosepalus* Franch. The unusual insertion of the achene beak was not mentioned in the Flora of China (Wang & Gilbert 2001), but is well developed on plants seen from the very narrow range of the species in China (*Yunatov et al. 948*, MO).

Other characters show considerable overlap, but still seem to show different ranges of variation in Central Asia and North America: thus, Central Asian plants always have solitary flowers, while North American material has 1–5 flowers per stem.

It seems clear, then, that Porsild (1943), Benson (1948), and Whittemore (1997) were wrong in treating the North American plant under the name *Ranunculus gelidus*, and recent authors who have used *R. karelinii* are incorrect on both taxonomic and nomenclatural grounds. The correct name for this buttercup is *R. grayi*, as used by Old World (and earlier North American) authors. It is unfortunate that it is necessary to introduce a third species name for these plants to the North American literature, but the name change is necessary to eliminate the incorrect application to North American plants of names belonging to a Central Asian endemic and reflect the true relationships of the North American plants. The following taxonomy ensues:

KEY TO *RANUNCULUS GELIDUS SENSU* FLORA OF NORTH AMERICA

1. Achene beak sharply inflexed so it is ± perpendicular to axis of achene. Petals 7–9 mm long, ca. twice as long as sepals. Central Asia ____ **Ranunculus gelidus**
1. Achene beak parallel to axis of achene. Petals 3–6 mm long, scarcely longer than sepals. North America, eastern Siberia ____ **Ranunculus grayi**

Ranunculus grayi Britton, Bull. Torrey Bot. Club 18:265. 1891. (**Fig. 2 E–H**). *Ranunculus pedatifidus* Hook., Fl. Bor.-Amer. 1:18, pl. 8 fig. B. 1829, not of Smith, The Cyclopaedia; or, Universial Dict. Arts,... 29: *Ranunculus* n. 72. 1818. *Ranunculus hookeri* Regel, Reis. Sud. Ostsib. Bot. Abt. 1:47. 1861, not of Schlechtendahl, Linnaea 5:210, 425. 1830. *Ranunculus drummondii* E. Greene, Erythea 2:192. 1894, nom. superfl. *R. gelidus* subsp. *grayi* (Britton) Hultén, Ark. Bot. (n.s.) 7:59. 1968. TYPE: "Barren summits of the Rocky Mountains, on the eastern side of the ridge, lat. 52° to 55°, *Drummond*."

Ranunculus verecundus B.L. Robinson ex Piper, Contr. U.S. Natl. Herb. 11:274–275. 1906. TYPE: WASHINGTON. YAKIMA CO.: Mount Paddo (=Mt. Adams), alt. 6000–7000 ft, *W.N. Suksdorf 93* (HOLOTYPE: GH 38452)

Ranunculus ramulosus M.E. Jones, Contr. W. Bot. 14:47. 1912. TYPE: MONTANA: Border of Glacier and Flathead Cos.: Swift Current Pass, Glacier National Park, 11 Aug 1910, *M.E. Jones s.n.* (HOLOTYPE: POM 100150)

Ranunculus gelidus var. *shumaginensis* Hultén nom. inval., Ark. Bot. (n.s.) 7:59. 1968, Madrono 19:223. 1968. Hultén's Arkiv for Botanik paper has only the name and a Latin diagnosis, with no mention of a type specimen at all. The Madrono reference merely adds, "Type in S," but gives no specimen information. Since there is no reference to a single specimen or gathering, the name is invalid (McNeill et al. 2006, art. 37.1–37.2).

Plants erect or decumbent from short caudexes, 3–22 cm. Roots slender, 0.5–1.0 mm thick. Leaves and stems glabrous or sparsely spreading-pubescent with long weak hairs, pedicels pubescent or glabrous. Basal leaves cordate or reniform, 0.5–1.8 × 0.8–3.0 cm, 3-parted (rarely 3-foliolate with sessile leaflets); segments again lobed, ultimate segments narrowly oblong or linear, 1.5–4 mm wide. Cauline leaves often larger, more deeply

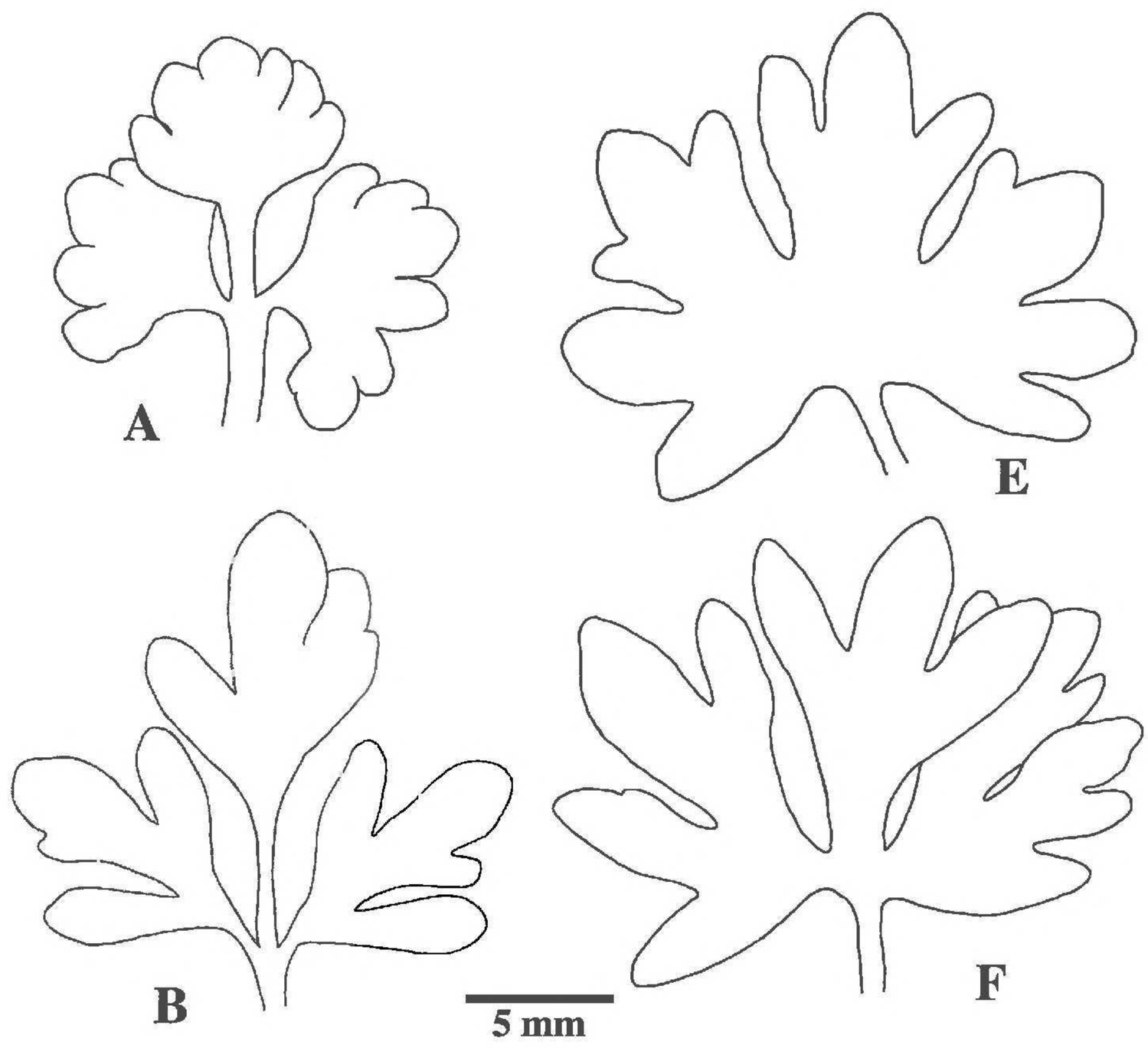

FIG. 2. Morphology of the two *Ranunculus* species. *Ranunculus gelidus*, A–B basal leaves, C a flower, D an achene. *Ranunculus grayi*, E–F basal leaves, G a flower, H an achene.

lobed, and with narrower segments. Flowers 1–5 per stem. Sepals 3–5 × 1–4 mm, pubescent or glabrous; petals 3–6 × 1–5 mm; receptacle glabrous or pubescent. Achenes 1.2–2.4 × 0.8–2.0 mm, glabrous, beak 0.4–0.8 mm, subulate, curved or hooked, parallel to axis of achene.

Seepy places in open rocky slopes and meadows, arctic and alpine. Widespread in western North America (from Alaska south to Oregon and Colorado; Benson 1948; Hitchcock & Cronquist 1964; Scoggan 1978; Whittemore 1997) and eastern Asiatic Russia (from the Lena Valley and the mountains east of Lake Baikal east to the Chukotka Peninsula; Voroshilov 1982; Tumokhina 1992; Cherepanov 1995).

Representative specimens examined: **CANADA. British Columbia:** clay run in rock crevice, Tenquille Lake area, Crown Mtn., 6000–6500 ft, *K. Beamish & F. Vrugtman 60938* (US); alpine slopes of Chipuin Mtn., Marble Mts., 6000 ft, *J.W. & E.M. Thompson 579* (US). Alpine slopes of Bluster Mtn., Marble Mts., 7000 ft, *J.W. & E.M. Thompson 384* (US). **U.S.A. ALASKA: Yakutat Co.:** head of Russell Fjord, *F.V. Coville & T.H. Kearney Jr. 940* (US). **Southeast Fairbanks (ca) Co.:** west-facing on small talus rhyolite, central N-S ridge of Sugarloaf Mtn., Healy (D-4), 63° 45 1/2' N, 148° 49' *W.S. Carwile 80-39* (US). **IDAHO. Blaine Co.:** alpine slopes at head of Boulder Creek Canyon, Sawtooth Mts., 10,000 ft, *J.W. Thompson 14100* (US). **Custer Co.:** Slide rock, 8000 ft, Bonanza, *J.F. Macbride & E.B. Payson 3394* (US). **MONTANA. Glacier Co.:** moist rocky slopes, frequent; vicinity of Sexton Glacier, 1950–2200 m, Glacier National Park, *P.C. Standley 17230* (US). **Judith Basin Co.:** Long Baldy, Little Belt Mts., 7000 ft, *J.H. Flodman 469* (US). **OREGON. Harney Co.:** alpine mountain meadow, Dino Creek headquarters, Steen's Mtn., 9000 ft, *P. Train s.n. 31vii35* (NA). **WASHINGTON. Pierce Co.:** rocky ridges and ledges, inter glacier, Mt. Tahoma (=Mt. Ranier), 7500 ft, *J.B. Flett 2177* (US). **Yakima Co.:** alpine slopes of Mt. Aix, 7500 ft, *J.W. Thompson 15046* (NA, US); on volcanic sand and gravel, Mount Paddo (=Mt. Adams), ca. 2400 m, *W.N. Suksdorf 4142* (US).

Ranunculus gelidus Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15:133. 1842. (**Fig. 2 A–D**).

Ranunculus karelinii S.K.Cherepanov, Sosud. Rast. SSSR, 425. 1981, nom. superfl. TYPE: In summis alpibus Alatau ad fontes fl. Lepsa, in glareosis ad scaturigines nivibus formatus deliquescentibus, 1841, Karelin et Kiriloff (ISOTYPE: NY - Torrey!)

Plant to 15 cm tall. Roots slender or fleshy, <1–2 mm thick. Leaves (margins and sometimes surfaces), stems, petioles and pedicels sparsely spreading-pubescent with long weak hairs. Basal leaves to 4–10 cm long, blade to 7–23 mm long, 12–25 mm wide, 3-foliolate, leaflets with well-defined petiolules; leaflets again 2–3-parted and the parts lobed, ultimate segments oblanceolate to obovate, 1–3 mm wide. Cauline leaves similar but shorter. Flowers solitary. Sepals 3–5 × 3–4 mm, spreading-pubescent with long weak hairs; petals 7–9 × 4.5–9 mm; receptacle pubescent. Achenes glabrous, 2.3 × 1.2 mm, very strongly asymmetrical (ventricose), beak 0.4 mm long, straight, inflexed so that it is ± perpendicular to axis of achene.

Alpine areas on stony soil and talus where watered by snowmelt. Endemic to the Jungarskiy Alatau and Tien Shan, Central Asia: Kazakhstan (Cherepanov 1995) and Xinjiang, China (Wang & Gilbert 2001).

Additional specimens examined: **KAZAKHSTAN:** Kumdaban, Jungar Mts., 9000 ft, May 1879, *A. Regel s.n.* (US). **CHINA. Xinjiang:** Tian Shan SW of Manas (W of Urumchi), on talus, 21 Jul 1957, *A.A. Yunatov, Li Shi-In, & Yuan Y-Fen 948* (MO).

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